

Role of Farm Programs in Environmental Sustainability of Agriculture

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Here we use the term agricultural sustainability to describe the challenge of maintaining agricultural production while conserving or improving the quality of natural and managed ecosystems. In focusing on economic and environmental sustainability we are abstracting from rural community issues, wellbeing of hired labor, the preferences with respect to the agricultural marketing system and other issues that are sometime included in discussions of agricultural sustainability. Sustainability of agriculture depends on production and resource use decisions of millions of independent farmers and ranchers. Farmers decide which crops to plant on which land and what practices to use. In addition to the values of the farmers themselves, the drivers of these decisions are technology, expected prices of inputs and outputs, and current and expected regulations and government subsidies or taxes.

The effect of commodity programs on environmental quality

Agricultural policies may affect all the drivers of agricultural sustainability. Target prices, public research funding, conservation programs and production subsidies are common in the history of farm programs. A substantial part of government policy today remains in farm commodity subsidies that are tied to current or historical production of five major field crops, with the distribution payments to participating producers of \$10 billion to \$25 billion per year from the federal government. Even though the main objective of these payments is not environmental sustainability, but rather income support, conservation of resources has been at the heart of agricultural policies since the beginning in the 1930s. Today, the main impact of these commodity programs stems from the incentive to produce more and use more land and other resources.

Estimating the reduction in program crop production if the government subsidies were removed is difficult and unsettled. Production impacts depend on the share of revenue from the subsidy program and nature of the production incentive in the programs, availability and importance of viable alternative crops and availability and importance of substitutes in demand, including production from global competitors. By stimulating production, subsidies depress or suppress market price in the United States and in global markets. Current estimates of the world price distortions caused by U.S. support range from a few percent to 10 percent more, for crops such as cotton and corn in years when market prices are expected to be low (Sumner, 2005). The impact of additional production incentives on the environment are even harder to quantify.

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First, acreage planted and farm practices are affected by the payments, and these responses vary with the specifics of the programs, commodities, or land characteristics. One must also assess the relative environmental consequences of alternative land use, such as crops that may be more or less benign than the program crop. Second, eligibility rules for commodity payments (conservation compliance) require minimal practices, such as not opening new fragile land to new crop production. Consequently, farmers enrolled in commodity programs face constraints that add complexity to the modeling and measurement task. Finally, quantifying the environmental impact of commodity programs involves filling the gap between farm practices and land use decisions and environmental outcomes.

Evaluating how farm commodity programs affect agricultural sustainability remains challenging for economists, agronomists and ecologists. The baseline expectation is that commodity programs have negative environmental impacts overall, but this may not hold in all regions for all program crops.

Conservation and environmental programs

Agricultural policy also affects environmental outcomes by defining standards on practices and proposing payments to farmers who implement additional practices. The first policy step is defining the constraints that producers face, by defining property rights on environmental outcomes (water use rights, pesticides regulations etc...). Defining the baseline property rights determines the roles for regulations, taxes and subsidies in cases where some externality or public good provides a convincing rationale for collective action. In agriculture we have often assumed that farmers will be subsidized to reduce negative environmental outcomes rather than be taxed or penalized for the current environmental consequences of their production practices. If rights to current practices resides with the farmer, then the second policy step is to design programs that reward farmers and ranchers for environmental improvement. In addition, agricultural policy provides technical support for conservation and environmentally friendly practices.

Farmers enroll conservation programs when their opportunity cost of adopting conservation practices are at least fully compensated. These opportunity costs are of three main types: yield reductions (from fertilizer use restrictions, buffer strips, etc.) less land in production (from land retirement programs) and additional costs.

Table 1 summarizes current commodity programs and conservation programs used in the United States. Table 2 summarizes main agricultural conservation programs.

Efficiency, information and who pays the bill.

Changing the impact of agriculture on the environment is costly. How much cost we wish to impose and on whom are key policy questions.

Until a few decades ago, a number of environmental resources were not valued enough to generate specific management institutions. Water quality and air quality for example, were rarely present in the agricultural policy agenda. Defining property rights means attributing the rights to use the resource, to individuals or collective entities. For most environmental issues related to agriculture the definition of property rights is still evolving, even though some consensus seems to be emerging. For example, large livestock production facilities now are meeting general emission standards in order to

improve water quality (Kuminoff 2006). Nonetheless, subsidies such as from the Environmental Quality Incentive Program (EQIP) offer cost sharing for farmers who implement new projects in order to meet emissions standards.

The definition of property rights also applies to defining a base or reference year for setting standards. Some programs support new practices (e.g. EQIP) whereas others reward farmers for an ongoing management, as is the case with the stewardship payments of the Conservation Security Program (CSP). The economic literature on carbon sequestration in agricultural soils, discusses the concept of additionality at length. The efficiency of the targeting mechanisms includes the definition of environmental benefit indexes and bidding mechanisms. Once minimum required good practices have been established, additional improvement can be encouraged and rewarded through conservation payments. In practice, property rights and incentives for additional measures are defined simultaneously since some payments are designed to support adjustments within evolving policy contexts.

One additional caveat to the formal distinction between required standards and additional services, is the formation of long term expectations when policy changes are gradual. Whereas paying farmers for practices already implemented is a major waste of resources for achieving environmental goals, it may reduce delay of implementation of good practices by potential future enrollees from fear of losing future payments.

A Note on the role the WTO in conservation policies in agriculture

WTO agreements limit the extent and form of commodity subsidies, have influenced program changes through litigation and are influences the current commodity program debate. The basic point is that WTO members may not use subsidies to the extent that they depress or suppress markets for other WTO member suppliers. These limitation have indirect impacts on conservation and environmental impacts by limiting production effects of subsidies and perhaps by facilitating a shift of funds from commodity subsidies to outlays to meet environmental objectives.

However, conservation and environmental subsidies are also vulnerable to challenge to the extent that they also stimulate production of eligible commodities. In general, subsidies to undertake environmentally friendly practices are considered at most minimally trade distorting if they do not pay more than the grower costs for practices or if they are not tied directly to input use of output. These standards are in place so that countries do not practice production subsidies in the guise of environmental programs. U.S. programs can be vulnerable to challenge if they contribute to the overall subsidy level for producers by being tied to acreage of land in crops and if the payments over compensate for the cost of practices undertaken.

The 2007 Farm Bill and Sustainability

The 2007 Farm Bill may allow the United States to review its current programs and align agricultural policy with societal objectives. Clearly some polices are less suited to meeting sustainability objectives. Sustainability is already playing a role in the debate. It is less clear how important sustainability will be in the final legislative package.

Literature for Further Reading

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Table 1. Commodity and Conservation Programs, acreage and outlays

	Acreage	Annual Value (or Program Level)	Average per acre
	<i>Million acres</i>	<i>Million dollars</i>	<i>\$ per acre per year</i>
Market Value of Crop Production	372 ^d	106,117 ^b	285
Crop support payments	268 ^c	19,559 ^a	73
Conservation payments:			
Conservation Reserve Program (CRP)	35 ^c	1,862 ^a	53
Environmental Quality Incentive Program (EQIP)	51 ^d	950 ^a	18
Conservation Security Program (CSP)	3.7 ^d	202 ^a	55
Wildlife Habitat Incentives Program (WHIP)	2.3 ^e	46 ^a	20

^a Source: United States Department of Agriculture (USDA) FY 2007 Budget Summary.

^b Source: National Agricultural Statistics Service (NASS) Value for 2005 from "Crop Values 2006 Summary"

^c Source: Base Acres in 2002, Farm Service Agency (FSA)

^d Source: Cropland, Economic Research Service (ERS)

^e Source: Natural Resource Conservation Service (NRCS)

Note: See Table 2 for program descriptions

Table 2 Characteristics of current conservation programs

Program	Enrollment criteria	Enrollment facts (2005)	Targeting method	Contract duration	Nature of payment
CRP ^a	Announced enrollment periods for most land and continuous enrollment for sensitive land.	35 million acres enrolled out of 39.2 million acres cap.	Cost efficiency ranking based on Environmental Benefit Index	10 to 15 years	Payment per acre based on county-specific rental value of land or lower bid
EQIP	Continuous sign up for eligible farmers and practices	49,406 enrolled 32,708 unfunded ^a	Ranking based on environmental performance of proposals and local resource priorities	Single payment (Not a contract)	Cost share (currently without bidding down option)
CSP	Yearly rotation by watershed distributed across states	18 in 2004, 220 in 2005, and 60 in 2006 ^b	Ranking based on priorities defined by local working group and states	5 to 10 years	Fixed Payment per acre for given practice and fixed whole farm payments ^c
WHIP	Continuous sign up for eligible farmers for improvements of wildlife habitat	3,342 enrolled 2,182 unfunded ^a	Use available funding according to local priorities	5 to 15 years, or more for higher cost shares	Cost share

Source: NRCS (2006) and Cattaneo, A., R. Claassen, R. Johansson, and M. Weinberg. (2005).

^a The CRP is the most important of the current retirement programs which also include the Conservation Reserve Enhancement Program (CREP) and the Wetland Reserve Program (WRP).

^b Number of eligible watersheds.

^c The CSP is based on a tier system where farmers can enroll a fraction or all of their acreage, for one or several environmental priorities (e.g. water quality, air quality, or wildlife habitat).